



## 1.1.2

### List of Employability/ Entrepreneurship/ Skill Development Courses with Course Contents

Colour Codes		
Employability Contents	Green	
Entrepreneurship Contents	Light Blue	
Skill Development Contents	Pink	
Name of the Subjects/Related to all three Components (Employability/ Entrepreneurship/ Skill Development)	Yellow	



### List of New Course(s) Introduced

**Department** : *Pure and applied physics*

**Programme Name** : *B.Sc. Electronics*

**Academic Year** : *2019-20*

### List of New Course(s) Introduced

Sr. No.	Course Code	Name of the Course
01.	PS/ELEC/C- 301P	Electronic Circuits Lab
02.	PS/ELEC/C- 302P	Digital Electronics and VHDL Lab
03.	PS/ELEC/C- 303P	C Programming and Data Structures Lab
04.	PS/ELEC/C- 401P	Operational Amplifiers and Applications Lab
05.	PS/ELEC/C- 403P	Electronics Instrumentations Lab
06.	PS/ELEC/C- 303L	C Programming and Data Structures Lab

*Umbipatni*

विभागाध्यक्ष/H.O.D.  
शुद्ध एवं अनुप्रयुक्त भौतिकी विभाग  
Dept. of Pure & Applied Physics  
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## Minutes of Meetings (MoM) of Board of Studies (BoS)

**Academic Year : 2018-19**

**School : School of Physical Sciences**

**Department : Pure and Applied Physics**

**Date and Time : July 13, 2018 - 11:30 AM; July 18, 2018 - 5:00 PM**

**Venue : Smart Class Room**

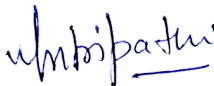
The scheduled meetings of member of Board of Studies (BoS) of Department of Pure and Applied Physics, School of Studies of Physical Sciences, Guru Ghasidas Vishwavidyalaya, Bilaspur, were held to design and discuss the B. Sc. (Physics) Second year (III and IV Semesters), scheme and syllabi.

The following members were present in the meeting:

1. Prof. P K. Bajpai
2. Dr. H. S. Tewari
3. Prof. S. B. Kondawar (External Member)
4. Dr. M. N. Tripathi
5. Dr. P. Thakur
6. Dr. R. K. Pandey
7. Dr. T. G. Reddy
8. Dr. R. P. Prajapati
9. Dr. A. K. Gupta
10. Dr. M. P. Sharma
11. Dr. P. Das
12. Dr. T. Trivedi
13. Dr. S. P. Patel
14. Prof. R. Dhar (External member)

The committee discussed and approved the scheme and syllabi. The following Skill Enhancement courses were added in the B. Sc. (Physics) Second year (III and IV Semesters):

- ❖ Electronic Circuits Lab
- ❖ Digital Electronics and VHDL Lab
- ❖ C Programming and Data Structures Lab
- ❖ Operational Amplifiers and Applications Lab
- ❖ Electronics Instrumentations Lab

  
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### Course Structure & Syllabus of B.Sc. Electronics Session -2019

#### School of Physical Sciences: B.Sc. Hon's (Electronics)

Semester	Course Opted	Course Code	Name of the course	Credit	Hour / week
I	Core-1	PS/ELEC/C-101L	Basic Circuit Theory and Network Analysis	4	4
	Core -1 Practical	PS/ ELEC /C-101P	Basic Circuit Theory and Network Analysis Lab	2	4
	Core -2	PS/ ELEC /C-102L	Mathematics Foundation for Electronics	4	4
	Core -2 Practical	PS/ ELEC /C-P-102P	Mathematics Foundation for Electronics Lab	2	4
	Generic Elective -1 (GE- IA)	PS/ELEC/GE-101	To be opted from the pool*	4	4
	Generic Elective - Practical	PS/ELEC/GE-P-101	GE-101 practical as opted	2	4
	Ability Enhancement Compulsory Course (AECC)	PS/ ELEC /AE-101/EC	English Communication / MFL (Hindi Communication)	4*	4
	ECA	Open elective (Optional)	ECA-Extracurricular activity/ Tour, Field visit/ Industrial training/ NSS/ Swachhta/ vocational Training/ Sports/ others	2	(2)
		TOTAL	24	28	
II	Core-3	PS/ ELEC /C-203L	Semiconductor Devices	4	4
	Core -3 Practical	PS/ ELEC /CP-203P	Semiconductor Devices Lab	2	4
	Core -4	PS/ ELEC /C-204L	Applied Physics	4	4
	Core -4 Practical	PS/ ELEC /CP-204P	Applied Physics Lab	2	4
	Generic Elective -2 (GE-IB)	PS/ ELEC /GE-202/	GE-102 (second course of the same subject as opted in GE-101)	4	4
	Generic Elective - Practical	PS/ ELEC /GE-P-202/	GE-202 practical as opted	2	4
	Ability Enhancement Compulsory Course (AECC)	PS/ ELEC /AE-201/ES	Environmental Science	4*	4
	ECA	Optional elective *	ECA-Extracurricular activity/ Tour, Field visit/ Industrial training/ NSS/ Swachhta/ vocational Training/ Sports/ others	2	(2)
		Total	24	28	

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SUMMER Internship: 15 days		Optional elective	Swayam Swachhta / NSS / Industrial/ others	2	100
III	Core-5	PS/ ELEC /C-301L	Electronic Circuits	4	4
	Core -5 Practical	PS/ ELEC /C-301P	Electronic Circuits Lab	2	4
	Core -6	PS/ ELEC /C-302L	Digital Electronics and VHDL	4	4
	Core -6 Practical	PS/ ELEC /C-302P	Digital Electronics and VHDL Lab	2	4
	Core - 7	PS/ ELEC /C-303L	C Programming and Data Structures	4	4
	Core - 7 Practical	PS/ ELEC /C-303P	C Programming and Data Structures Lab	2	4
	Generic Elective -3 (GEH-A)		To be opted from the pool of GE	4	4
	Generic Elective - Practical			2	4
	Skill Enhancement Course (SEC - 1)		To be opted from the pool of SE courses**	4*	2 (4)
Total			28	34	
IV	Core-8	PS/ ELEC /C-401L	Operational Amplifiers and Applications	4	4
	Core -8 Practical	PS/ ELEC /C-401P	Operational Amplifiers and Applications Lab	2	4
	Core -9	PS/ ELEC /C-402L	Signals and Systems	4	4
	Core -9 Practical	PS/ ELEC /C-402P	Signals and Systems Lab	2	4
	Core - 10	PS/ ELEC /C-403L	Electronic Instrumentation	4	4
	Core -10 Practical	PS/ ELEC /C-403P	Electronic Instrumentation Lab	2	4
	Generic Elective -4 (GEH-B)		To be opted from the pool of Generic courses	4	4
	Generic Elective - Practical			4	4
	Skill Enhancement Course (SEC -2)		To be opted from the pool of SE courses	4*	2 (4)
TOTAL			28	34	
SUMMER Internship: 15 days		Optional elective	Swayam Swachhta / NSS / Industrial/ others	2	100
V	Core-11	PS/ ELEC /C-501L	Microprocessors and Microcontrollers	4	4
	Core -11 Practical	PS/ ELEC /C-501P	Microprocessors and Microcontrollers Lab	2	4
	Core -12	PS/ ELEC /C-502L	Electromagnetics	4	4
	Core -12 Practical	PS/ ELEC /C-502P	Electromagnetics Lab	2	4

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	Discipline Specific Elective (DSE-1)	PS/ELEC/DSE-501L	DSE-1	4	4
	DSE-1 - Practical	PS/ELEC/DSE-501P	DSE-1 Lab	2	4
	Discipline Specific Elective (DSE-2)	PS/ELEC/DSE-502L	DSE-2	4	4
	DSE-2 - Practical	PS/ELEC/DSE-502P	DSE-2 Lab	2	4
			TOTAL	24	32
VI	Core-13	PS/ ELEC /C-601L	Communication Electronics	4	4
	Core -13 Practical	PS/ ELEC /C-601P	Communication Electronics Lab	2	4
	Core -14	PS/ ELEC /C-602L	Photonics	4	4
	Core -14 Practical	PS/ ELEC /C-602P	Photonics Lab	2	4
	Discipline Specific Elective (DSE-3)	PS/ELEC/DSE-503L	DSE-3	4	4
	DSE-3 - Practical	PS/ELEC/DSE-503P	DSE-3 Lab	2	4
	Discipline Specific Elective (DSE-4) + DSE-4 - Practical	PS/ELEC/PD		4+2=6	8
	Or Dissertation/ Project work followed by seminar			5+1=6	
			TOTAL	24	32
			<b>TOTAL CREDITS</b>	<b>152 + 4 (SI)</b>	

As per UGC CBCS guidelines, University / departments have liberty to offer GE and SEC courses offered by any department to students of other departments. The No. of GE course is four. One GE course is compulsory in first 4 semesters each. In present scheme it is proposed to have minimum two GE courses (from one subject) in first two semesters after which student shall change two GE for another subject in III<sup>rd</sup> and IV<sup>th</sup> semester, so that all the student can have exposure of one additional subject. (Subject to approval by the competent authority).

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 Approved by  
 Faculty  
 Council



General electives to be offered by Electronics (for Physics/Maths /Electronics/ Comp. Sc. students)

GE/101/ELEC: Basic Circuit Theory and Network Analysis ✓ *for*

GE/102/ ELEC: Mathematics Foundation for Electronics ✗

GE/201/ ELEC: Semiconductor Devices ✗

GE/202/ ELEC: Applied Physics ✓ *for*

List of General elective for Electronics Honors: (1st SEM)

GE/201/Maths

GE/202/Maths

GE/201/PHY

GE/202/PHY

GE/201/COMP. Sc.

GE/202/COMP. Sc.

Skill Enhancement Courses (02 to 04 papers) (Credit: 02 each)- SEC1 to SEC4

1. Design and Fabrication of Printed Circuit Boards (4)
2. Electronics Workshop Skills
3. Electrical circuit network Skills
4. Basic Instrumentation Skills
5. Renewable Energy and Energy harvesting
6. Radiation Safety

*for* *for*  
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**Electronics Circuits Lab**  
(Hardware and Circuit Simulation Software)  
60 Lectures

**Objective** - To learn the characteristics of FET in common source mode, of half as well as full wave rectifiers, of regulated powersupply, of common Emitter based amplifier, of class A, Class B amplifier and of oscillators such as Colpitt and Hartley.

1. Study of the half wave rectifier and Full waverectifier.
2. Study of power supply using C filter and Zenerdiode.
3. Designing and testing of 5V/9 V DC regulated power supply and find itsload-regulation
4. Study of clipping and clamping circuits.
5. Study of Fixed Bias, Voltage divider and Collector-to-Base bias Feedback configuration for transistors.
6. Designing of a Single Stage CEamplifier.
7. Study of Class A, B and C PowerAmplifier.
8. Study of the Colpitt'sOscillator.
9. Study of the Hartley'sOscillator.
10. Study of the Phase ShiftOscillator
11. Study of the frequency response of Common Source FETamplifier.

**Outcomes** – students will be learn basic function of single stage amplifier, multistage amplifier and power Amplifier and their working principle.

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T. Reddy  
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## Digital Electronics and Verilog/VHDL Lab

(Hardware and Circuit Simulation Software)

60 lectures

### Objective –

- To learn Hardware Descriptive Language (Verilog/VHDL)
- To make the student learn and understand the basics of Logic Gates with CMOS such as NAND, NOR gates and flip flop.

- To verify and design AND, OR, NOT and XOR gates using NAND gates.
- To convert a Boolean expression into logic gate circuit and assemble it using logic gateIC's.
- Design a Half and Full Adder.
- Design a Half and Full Subtractor.
- Design a seven segment display driver.
- Design a 4 X 1 Multiplexer using gates.
- To build a Flip- Flop Circuits using elementary gates. (RS, Clocked RS, D-type).
- Design a counter using D/T/JK Flip-Flop.
- Design a shift register and study Serial and parallel shifting of data.

### Experiments in Verilog/VHDL

- Write code to realize basic and derived logic gates.
- Half adder, Full Adder using basic and derived gates.
- Half subtractor and Full Subtractor using basic and derived gates.
- Clocked D FF, T FF and JK FF (with Reset inputs).
- Multiplexer (4x1, 8x1) and Demultiplexer using logic gates.
- Decoder (2x4, 3x8), Encoders and Priority Encoders.
- Design and simulation of a 4 bit Adder.
- Code converters (Binary to Gray and vice versa).
- 2 bit Magnitude comparator.
- 3 bit Ripple counter.

### Outcomes -

- Verifying the concepts of gates, flip flop, adder and subtractor.
- Understanding the logic gate experiments in Verilog/VHDL.

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## C Programming and Data Structures Lab

### 60 Lectures

#### Objective-

- To develop programming skills using the fundamentals and basics of C Language.
- To enable effective usage of arrays, structures, functions, pointers and to implement the memory management concepts.

- Generate the Fibonacci series up to the given limit N and also print the number of elements in the series.
- Find minimum and maximum of N numbers.
- Find the GCD of two integers.
- Calculate factorial of a given number.
- Find all the roots of a quadratic equation  $Ax^2 + Bx + C = 0$  for non-zero coefficients A, B and C. Else report error.
- Calculate the value of  $\sin(x)$  and  $\cos(x)$  using the series. Also print  $\sin(x)$  and  $\cos(x)$  value using library function.
- Generate and print prime numbers up to an integer N.
- Sort given N numbers in ascending order.
- Find the sum & difference of two matrices of order  $M \times N$  and  $P \times Q$ .
- Find the product of two matrices of order  $M \times N$  and  $P \times Q$ .
- Find the transpose of given  $M \times N$  matrix.
- Find the sum of principle and secondary diagonal elements of the given  $M \times N$  matrix.
- Calculate the subject wise and student wise totals and store them as a part of the structure.
- Maintain an account of a customer using classes.
- Implement linear and circular linked lists using single and double pointers.
- Create a stack and perform Pop, Push, Traverse operations on the stack using Linear Linked list.
- Create circular linked list having information about a college and perform Insertion at front, Deletion at end.
- Create a Linear Queue using Linked List and implement different operations such as Insert, Delete, and Display the queue elements.
- Implement polynomial addition and subtraction using linked lists.
- Implement sparse matrices using arrays and linked lists.
- Create a Binary Tree to perform Tree traversals (Preorder, Postorder, Inorder) using the concept of recursion.
- Implement binary search tree using linked lists. Compare its time complexity over that of linear search.
- Implement Insertion sort, Merge sort, Bubble sort, Selection sort.

#### Outcomes -

- Develop programs using the basic elements like control statements, Arrays and Strings
- Students will understand basics of numerical analysis such as finding maximum and minimum number, factorial of a number, numbers in ascending order, sum as well as difference of matrices, etc.

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**Operational Amplifiers and Application Lab**  
**(Hardware and Circuit Simulation Software)**

**60 Lectures**

**Objective-**

- To design and analyse of op-amp amplifiers,
  - To study characteristics of multivibrator using IC 555.
1. Study of op-amp characteristics: CMRR and Slew rate.
  2. Designing of an amplifier of given gain for an inverting and non-inverting configuration using an op-amp.
  3. Designing of analog adder and subtractor circuit.
  4. Designing of an integrator using op-amp for a given specification and study its frequency response.
  5. Designing of a differentiator using op-amp for a given specification and study its frequency response.
  6. Designing of a First Order Low-pass filter using op-amp.
  7. Designing of a First Order High-pass filter using op-amp.
  8. Designing of a RC Phase Shift Oscillator using op-amp.
  9. Study of IC 555 as an astable multivibrator.
  10. Study of IC 555 as monostable multivibrator.
  11. Designing of Fixed voltage power supply using IC regulators using 78 series and 79 series

**Outcomes** - students will be able to use OP Amp to generate sine waveform, Square wave form, Triangular wave forms.

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## Electronic Instrumentation Lab

### 60 Lectures

#### Objective –

- To provide fundamental concepts of control system such as mathematical modelling, time response and frequency response.
  - To develop concepts of stability and its assessment criteria.
- Design of multi range ammeter and voltmeter using galvanometer.
  - Measurement of resistance by Wheatstone bridge and measurement of bridge sensitivity.
  - Measurement of Capacitance by Debye's method.
  - Measurement of low resistance by Kelvin's double bridge.
  - To determine the Characteristics of resistance transducer - Strain Gauge (Measurement of Strain using half and full bridge.)
  - To determine the Characteristics of LVDT.
  - To determine the Characteristics of Thermistors and RTD.
  - Measurement of temperature by Thermocouples and study of transducers like AD590 (two terminal temperature sensor), PT-100, J-type, K-type.
  - To study the Characteristics of LDR, Photodiode, and Phototransistor:
    - Variable Illumination.
    - Linear Displacement.
  - Characteristics of one Solid State sensor/ Fiber optic sensor

#### Outcomes - After successful completion of the course student will be able to

- Students will be able to explain principle of operation for various sensors.
- Students will be able to describe functional blocks of data acquisition system.

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30-4-2019

30/04/2019

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## C Programming and Data Structures (Credits: Theory-04, Practicals-02)

### Objective-

- To develop programming skills using the fundamentals and basics of C Language.
- To enable effective usage of arrays, structures, functions, pointers and to implement the memory management concepts.

### Theory Lectures 60

**Unit-1 (12 Lectures): C Programming Language:** Introduction, Importance of C, Character set, Tokens, keywords identifier, constants, basic data types, variables: declaration & assigning values. Structure of C program Arithmetic operators, relational operators, logical operators, assignment operators, increment and decrement operators, conditional operators, bit wise operators, expressions and evaluation of expressions, type cast operator, implicit conversions, precedence of operators. Arrays-concepts, declaration, accessing elements, storing elements, two-dimensional and multi-dimensional arrays. Input output statement and library functions (math and string related functions).

**Unit-2 (19 Lectures): Decision making, branching & looping:** Decision making, branching and looping: if, if-else, else if, switch statement, break, for loop, while loop and do loop. Functions: Defining functions, function arguments and passing, returning values from functions. **Structures:** defining and declaring a structure variables, accessing structure members, initializing a structure, copying and comparing structure variables, array of structures, arrays within structures structures within structures, structures and functions. Pointers. **Introduction to C++:** Object oriented programming characteristics of an object-oriented language.

**Unit-3 (15 Lectures): Data Structures:** Definition of stack, array implementation of stack, conversion of infix expression to prefix, postfix expressions, evaluation of postfix expression. Definition of Queue, Circular queues, Array implementation of queues. Linked List and its implementation.

**Unit-4 (14 Lectures): Searching and sorting:** Insertion sort, selection sort, bubble sort, merge sort, linear Search, binary search **Trees:** Introduction to trees, Binary search tree, Insertion and searching in a BST.

**Outcomes -** Students will able to select appropriatedata structures as applied to specified problem definition.

### References:

- Yashavant Kanetkar, Let Us C , BPB Publications
- Programming in ANSI C, Balagurusamy, 2nd edition, TMH.
- Byron S Gottfried, Programming with C , Schaum Series
- Brian W. Kernighan, Dennis M. Ritchie, The C Programming Language, Prentice Hall

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